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THE NATIONAL ACADEMY OF SCIENCES

PRESENTATION OF MEDALS AND HONORARIA

AT the annual meeting of the National Academy of Sciences, held from April 23 to 25 in Washington, five medals and four honoraria were awarded. A brief announcement of these awards was included in the address of the president of the academy, published in SCIENCE of May 4. The medals and honoraria are given in recognition of important contributions to knowledge and for encouragement of research activity in the future. As stated by the president in his address, the academy's ability to confer honor upon its members and others of high achievement proceeds from the honors conferred upon the academy by its members through their accomplishments in the advancement of knowledge. The academy is designated in its charter from Congress an adviser to the Government in scientific matters. Election to membership in the academy carries with it the obligation to aid in the solution of any problem of a scientific nature on which the Government seeks advice. In view of this relationship the following extracts from the speeches made at the time of the presentation of the medals and honoraria are of interest.

PRESENTATION OF THE MARCELLUS HARTLEY MEDAL TO DR. DAVID FAIRCHILD

In making the presentation, Dr. Henry H. Donaldson, of the Wistar Institute of Anatomy and Biology, said:

It is my privilege to announce the award of the Marcellus Hartley Gold Medal for the year 1934 to Dr. David G. Fairchild (from 1889 until his retirement two or three years ago, on account of ill health, an invaluable member and officer of the Department of Agriculture), for eminence in the application of science to the public welfare. Specifically, the award is made for Dr. Fair-

child's exceptional accomplishments in the development and promotion of plant experiments; for the introduction of new plants, grains, shrubs and trees into the United States; and for his services of a working lifetime, which have contributed to the easy availability of some of our finest fruits, grains, and vegetables, thus adding to the wealth of the nation by opening new lines of activity to American farmers.

The response in Dr. Fairchild's behalf was made by Mr. Knowles A. Ryerson, chief of the Bureau of Plant Industry in the Department of Agriculture, who read the following letter, addressed to the president of the academy by Dr. Fairchild:

You can imagine, Mr. President, my deep regret that I can not be present in person to receive this Medal, for I regard the awarding of it to me as the greatest honor of my life. Unfortunately, a long and serious illness has led the doctors to advise against the making of the trip from Florida so strongly that I feel obliged to obey.

It has seemed appropriate to ask my colleague, Knowles Ryerson, to act as my representative on this important occasion, for, as one of my successors in the Office of Foreign Plant Introduction, and now as chief of the Bureau of Plant Industry, he is closely identified with the work in which my life has been spent.

In accepting this Medal I have been asked to express my sentiments in a few words; perhaps in justification of my right to it. I feel my unworthiness to such a degree that I find this very difficult. I am perhaps too conscious of the greater, more worthy accomplishments of those with whom I have been associated since my early youth, and who have not been thus honored. I am only too well aware of the fact that in such work as this for which I am being honored others who remain in obscurity have played a major part.

I take it that the purpose of this gold medal is less to call the public's attention to my own doings than to those of a group of personalities whose activities in the Government service have led to a substantial increase in our country's agricultural wealth and have contributed as well to the beauty of the home surroundings of its people.

The pleasure I have found in my work should be recompense enough in itself. I deserve no medal and desire no particular praise. I have done what I wanted to do, and the Government and good fortune have favored me in my desire. And now, as I approach the closing years of my life and look back, the romance of it all seems more than by right should have come to any one man.

I have seen date palms that I collected on the banks of the Tigris grow and become a part of large plantings in our Southwest. I have had the pleasure of picking nectarines in California orchards from trees that came from the hills of Baluchistan. I have mango trees on my own place, and there are thousands of them in South Florida, that have come from seeds and cuttings I collected in British India and Cochin China; these are now heavy with fruit. I have wandered through shady groves of bamboos and have eaten delicious shoots of bamboos that I was instrumental in bringing to America from Japan.

This spring I am painting my house with Florida-grown Chinese Tung-oil. It is a pleasure to remember that I had a hand in the first experimental work done in America with this remarkable nut tree, now grown on thousands of acres in Florida.

It is with a thrill that I remember, each time I drink a glass of soybean milk, that in 1898, before we knew how to grow soybeans in this country, I sent to Tokyo for soil with which to inoculate the root systems of our experimental plantings of them, little thinking that I should see the day when four million acres of soybeans would be grown in America.

It is a satisfaction to feel that I have played my part in the introduction of the Peruvian hairy alfalfa that has been so successful in our Southwest, and to know that hardy varieties of this great forage crop are now covering the plains of our Northwest and the upper Mississippi Valley.

To have advocated and, in a measure, personally taken part in the introduction of such remarkably successful grain crops as the Durum wheats, the Feterita sorghum, the Finnish black oat, the Hannah and Mariot barleys, and other successful varieties of grains, is, it seems to me, to have done something worth while.

To have realized the popularity which would come to the Japanese flowering cherries, to have brought in a special collection of them from Japan in 1902, and to have in every way assisted in their plantings in Washington, may not seem much to others, but they bring a thrill to me.

But more important than any of these accomplishments, I deem to be the building up in the Government Department of Agriculture of a Foreign Plant Introduction Service, whose purpose, through the thirty-six years of its existence, has been to bring into our country a constantly increasing stream of useful plants from other lands. I believe that the future agricultural wealth of America will be concerned with some of the more than a hundred thousand different strains, varieties or species of plants that have been brought in through this Service; for these species will not only make it possible to utilize more thoroughly the different kinds of soils and climates, but to increase in many ways the enjoyment and comfort of a growing class of people who will find their happiness in the great open spaces rather than in our overcrowded cities.

All this work has been possible only with the aid and the advice and the conscientious assistance of a number of remarkable associates whose names I wish I might be able to mention here.

With these thoughts in mind, I accept the honor the National Academy of Sciences sees fit to bestow in the form of its Public Welfare Medal, as a tribute to the success which has accompanied the efforts of my colleagues as well as of myself.

PRESENTATION OF THE DANIEL GIRAUD ELLIOT MEDAL AND HONORARIUM FOR 1930 TO DR. GEORGE ELLETT COGHILL

In making the presentation, Dr. Ross G. Harrison, Sterling professor of biology in Yale University, and chairman of the committee on awards, said:

Last year, on the recommendation of the committee, the academy voted to award the medal and honorarium ($200.00) for 1930 to Dr. George Ellett Coghill, of the Wistar Institute of Anatomy and Biology, for his work entitled "Correlated Anatomical and Physiological Studies of the Growth of the Nervous System of Amphibia." Study IX of this series was published in the year 1930, the first having appeared in 1914. It falls to my lot to state briefly the reasons for the award.

Biologists have long realized that the development of the individual organism is one of the central problems of their science. Judged by popular interest and knowledge, however, one could hardly place embryology in such an exalted position, for, strange to say, the average man seems to care more about his remote origin than about the early history of his own individual past. This is all the more remarkable since the transformation of the single egg cell into the mature organism is an experience through which we have all passed. That we are oblivious of the early period of this transformation does not argue against its power to fix upon us peculiarities we show in later life.

Embryologists have dealt for the most part with the development of organic form, disregarding the fact that with it goes hand in hand the development of activities or function. The correlation of these two phases of development, because of the difficulties involved, has not received the attention it merits. It is precisely in this field that Dr. Coghill's pioneer work has won for him a place of high distinction.

The human organism, which begins its development as a parasite well concealed from observation by the inquisitive, is ill adapted for studies of this kind. It has, therefore, been found advantageous to go to the lower vertebrates, particularly to the frogs and salamanders, for a material that may be obtained in abundance and which from the first is amenable to observation and experiment. That the amphibian mother casts her progeny loose at the time of fertilization, while not praiseworthy from the humane standpoint, is a boon to the embryologist.

The amphibian embryo, still in its envelopes, shows the first muscular movements when its external form begins to shape itself and head, trunk and tail are easily recognized. The character of these movements rapidly undergoes a series of changes during the remainder of embryonic life until at hatching they are quite complex and the young animal is able to shift for itself. The progressive changes in reaction have been followed by Dr. Coghill step by step in individual embryos, and at each stage cases taken immediately after their reactions had been tested were preserved and studied microscopically. In this way the actual state of differentiation of the nervous system in each individual has been correlated with its behavior. It has been found that a progressive differentiation of nerve cells, fibers and sense organs takes place, preceding by a short interval the initiation of the corresponding reactions. Associated with differentiation, but in a certain sense antagonistic to it, is the process of growth, the study of which has required the counting of thousands of cells and charting their positions in the spinal cord and brain at various stages of development. This has involved an immense amount of painstaking work which would all have been to little purpose, had the task not been approached by a man of broad knowledge and subtle insight.

From all this has developed a new conception of the origin of nervous function. At no time does the nervous system work as a collection of independent reflexes, which later become integrated. On the contrary, at each stage it functions as a whole, expanding from stage to stage, and as development proceeds, various partial functions arise within it as more or less discrete reflexes.

These investigations of Dr. Coghill will have a lasting influence in psychology and physiology as well as in embryology.

PRESENTATION OF THE DANIEL GIRAUD ELLIOT MEDAL AND HONORARIUM FOR 1931 TO THE LATE DR. DAVIDSON BLACK

In making the presentation, Dr. Henry Fairfield Osborn said:

I feel sure that Dr. Elliot, a lifelong and intimate personal friend of mine, would warmly endorse for the year 1931 the award to Dr. Davidson Black, professor of anatomy of the Peiping Union Medical College in China.

The honor falls to me of describing his share in the discovery and his unique part in the description, according to the very highest standards of modern prehistoric anthropology, of the Peking man, *Sinanthropus pekinensis*, which has already become a classic. These additions to the great and highly diversified family tree of man were discovered in the years 1926 to 1929 in a cave fissure deposit about thirty-five miles southwest of Peiping, a deposit of very hard limestone known for many years to yield rich fossil remains of the early Pleistocene period estimated at approximately one million years ago. Infinite patience and infinite technical skill were required to free these fragile specimens from the matrix and a very high order of anatomical knowledge to correctly interpret them. From 1926 to 1934 Davidson Black devoted his entire strength, energy and skill to exposing and examining this series, which yielded one type lower molar (1927), two adult or nearly adult skulls, six parts of adult and immature mandibles, various separate teeth, limb and girdle fragments, a wrist bone, phalanges, etc. To these remains the scientific name most aptly applies—"the man of China found near Peking."

In a long series of brilliant publications, culminating in the monograph of 1931 for which this Elliot Medal is

given, "On an Adolescent Skull of Sinanthropus Pekinensis in Comparison with an Adult Skull of the Same Species and with Other Hominid Skulls, Recent and Fossil," all the characteristics of these specimens were carefully set forth, figured and described with the result that Peking man is shown to be extraordinarily similar to the Trinil man (*Pithecanthropus*) in its form and brain size and structure while differing most widely from the Piltdown man of Sussex not only in the beetling forehead but in the relatively massive jaw. Thus its closest affinity is to the Trinil cranium while in its grinding tooth structure thoroughly human or Neanderthaloid.

Death has been making some terrible mistakes of late. A tragic feature of this award is that Davidson Black did not live to receive this medal and enjoy the fellowship with the great names of previous awards. On March 16, while sitting at his desk in his Peiping Laboratory, he died suddenly of heart disease. While anatomy has suffered this great blow, let us express our sentiment of admiration and fellowship by the award of the fourteenth Daniel Giraud Elliot Medal for the year 1931.

May we inscribe to him the lines from Milton's *Lycidas:*

> For Lycidas is dead, dead ere his prime
> Young Lycidas, and hath not left his peer.

PRESENTATION OF THE CHARLES DOOLITTLE WALCOTT MEDAL AND HONORARIUM TO DR. DAVID WHITE

In making the presentation, Professor Emeritus Charles Schuchert said:

The train of events that culminates to-night in the first award of the Walcott Medal might be said to have had its beginning one day in 1867, when a young fossil collector found, near his home in Oneida County, New York, a drift rock containing organic remains that differed wholly from those with which his growing cabinet was filled. His curiosity regarding these strange fossils remained unsatisfied until eleven years later, when he found identical ones in a quarry near Saratoga Springs, and learned that they were of "primordial time," at the base of the New York System. His attention once turned to these early Paleozoic organisms, Walcott's never ceasing study of their specific and generic evolution finally made him the world's authority on the life and history of Cambrian times.

In the late fall of 1882, Major Powell, director of the United States Geological Survey, took Walcott to the Grand Canyon and left him there with this message: "Young man, I now leave you and your helpers to the work assigned you. In a few days all the upper levels of the canyon will be covered so deeply with snow and ice that none of you will be able to get out until early spring. I hope by that time you will have worked out the stratigraphic succession and gathered enough fossils to prove the ages of the various formations!" It was late March when Walcott came out of the canyon, and, in addition to what was expected of him, he again had "primordial" fossils, and not only these, but organisms of a still older time—the first traces of Precambrian life. From then on, as his studies showed the marvelous complexity of Cambrian life, he was ever looking still further backward to find the ancestors of these strange Cambrian creatures, and in this search he was more successful than any other paleontologist of his time. However, no one has yet found in abundance the Precambrian life that Walcott so earnestly sought, and it was with the idea of stimulating others to realize his unfulfilled ambition that Mrs. Walcott, who helped her husband collect many a hundredweight of Precambrian algae, presented to the National Academy the fund which yields the medal and honorarium to be presented here to-night.

The lure of the Grand Canyon is indeed very great, not only for the poet and the painter, but especially for the geologist, since he who stands on the brink of this mighty chasm looks back through the geological ages for more than a thousand million years. In the upper walls of the Canyon occur Carboniferous land plants, which have formed the basis for one of the classics of paleobotanical literature, "Flora of the Hermit Shale, Grand Canyon, Arizona," written by David White, whose extraordinary knowledge of the coal floras has played no small part in the unraveling of our late Paleozoic stratigraphy. In the course of his work in the canyon, Dr. White's attention had been especially directed to the traces of Precambrian organisms which had been found there by Walcott and others, and which had been rendered even more significant by subsequent discoveries of similar forms in the Belt series of Montana. For several field seasons he studied with great care the detailed environment of these ancient fossils, and collected them in abundance, and he has demonstrated, with his customary thoroughness, that the deposits in which they were entombed were those of a shallow sea, and not, as had been supposed, those of a fresh-water lake. What is even more significant, he has, by new methods of laboratory research, both of a physical and a chemical nature, revealed the micro-structure of these remains and established them definitely as algae. His preliminary results have already appeared in a number of papers, and his monograph, to be published by the Carnegie Institution of Washington, will bring together his studies on a great mass of material, much of which was collected by Walcott. His researches thus mark a decided step forward in our knowledge of Precambrian life.

Therefore, Mr. President, I ask you, on behalf of the Walcott Fund Committee, which includes in its membership representatives of the Royal Society of England, the French Academy and the Smithsonian Institution, to make the first award of the Walcott Medal and Honorarium ($1,350.00) to Dr. David White, for his outstanding work on the Precambrian algae of the United States.

Dr. White responded as follows:

While accepting this medal I realize that I have but watered a little the planting—the pioneer work—of that great explorer of ancient life, to whose far-seeing vision, indomitable faith and eminent achievements this memorial is fittingly dedicated.

The greater part of the records of Precambrian life and history are, in effect, palimpsests on which the original records have been overwritten and later perhaps overwritten again by inscriptions which are generally dis-

connected and often without date. The original characters may be disfigured or effaced by rock deformation and intrusions; washed out in the processes of chemical replacement; masked by recrystallization or fused by subterranean heat. Yet records were certainly made covering all the complex events of Precambrian eons, and there can be no doubt that records still exist and that they will eventually be found, deciphered, pieced together and woven into the history of an almost incredible past.

Proofs of the existence of life, of periods of great mountain building, of vast degradation and continental movements are unmistakably visible. Although we can not yet unravel their history, somewhere, in some region, Precambrian strata will, in localities not yet fully investigated, be found to have escaped the withering destruction of metamorphism. Finds of inclusions, nodules, conglomerates and, happily, early replacements of cell structure itself, will eventually be brought to light. These reconstructed records, reaching hundreds of millions of years back into the dawn of life, will, when restored, be found, I am certain, far more thrilling, inspiring and impressive than the hypothetical pictures drawn by the theoretical evolutionist.

The increasing number of Precambrian deposits that are now dated more or less accurately by the ratios of the products of the atomic disintegration of their radioactive minerals—dating late Precambrian rocks at 7 or 8 hundred millions, Huronian at 10 or 11 hundred millions, Laurentian probably beyond 12 hundred millions, and other deposits as far back as 16 hundred million years or more, has changed the quest for knowledge of Precambrian life from a mere lure to a challenge; from hope to command.

It is good for us, and productive of seemly humility, to reflect that the light of a very distant galaxy—a spiral nebula—so far away that it barely records an image of itself on the photographic plate exposed by the 100-inch reflector on Mount Wilson, left its distant source while the giant, silvery Orthocerases were still basking and fighting in the transparent shallows of a late Ordovician sea, and that the duration of life within Precambrian time was much longer than—more likely nearly twice as long as—all the time from the beginning of the Paleozoic to the present moment.

It is true that only a crude beginning has been made in the unraveling of the history of Precambrian life and times. The task is bafflingly arduous; the paths, leading astray, are labyrinthic, but vision, courage and method will prevail. To this end the Walcott Foundation and the Walcott example are continuing and inspiring influences, actuating researches from which should flow galaxies of discoveries rich in intellectual and philosophical profit to mankind.

PRESENTATION OF THE AGASSIZ MEDAL FOR 1933 TO BJORN HELLAND-HANSEN, OF THE OCEANOGRAPHIC INSTITUTE, BERGEN, NORWAY

In his presentation address, Dr. H. B. Bigelow, director of the Woods Hole Oceanographic Institution, said:

In every advance in oceanography, certain names stand forth. And when scientific accounts are cast we find Dr. Björn Helland-Hansen—often linked with his one-time master and life-long associate, Fridtjof Nansen—a key name in developments that have become integral in modern science of the sea.

To-day physical oceanography may justly be named an exact science; it is worth remembering that this was not always the case; so recently, even, that it falls within the memory of many of us. It was Helland-Hansen and Nansen who first clearly appreciated and published to the scientific world the fact that the oceans are so uniform over great distances and over great ranges of depth that only from the most precise measurements and determinations can the true physical characteristics of the high seas be learned. Nor was this an advance in technique only, for practise and theory marched hand in hand. And in 1909 Helland-Hansen and Nansen jointly published their classic study of the Norwegian sea, in which they so accurately traced its essential physical characteristics, with the ebb and flow of the ocean currents, as to make this at a stroke the best known part of the ocean, and their monograph a model for all the regional studies in descriptive oceanography that have followed it.

A second field in which we all think of Helland-Hansen as a master is that of the dynamics of the sea. Here again for perspective we must turn back to the early years of the century. It had long been realized that archimedean forces must be of major import in oceanic circulation. In 1898 the elder Bjerkenes (also an Agassiz medalist) had published his classic discussion of the dynamics of air and sea. In 1903 we find Helland-Hansen and Sandstrom (then young men) developing a simple and workable method by which Bjerkenes' theoretic analysis might be applied numerically to conditions as actually existing in the sea, with calculation of dynamic currents in the waters between Norway and Iceland as a test case. Later came Bjerkenes' monumental volumes on dynamic meteorology and hydrography, following which, and with gradual developments in mathematical method (in which Helland-Hansen's touch is repeatedly to be seen) many dynamic studies have been made for different parts of the sea. The current surveys made on the Grand Banks by the International Ice Patrol Service are a direct result of Helland-Hansen teachings. But again it awaited Helland-Hansen, working with Nansen as so often, to apply dynamic calculation to accumulated data for a great ocean, and so to make clear the circulatory tendencies existing on so broad a scale throughout the whole mile-deep mass of water.

There are many other accomplishments that I must pass by with mere mention—his detection of the penetration of light to great depths; his many regional studies of the sea; his measurements and discussions of tidal currents down into the deeps; his studies (again with Nansen) of thermal variations in sea and atmosphere; his teachings by word and pen. But there is one other picture I must indeed leave with you. And here we must again turn back the pages of oceanographic history. There was a time, even within my own memory, when the practise of sea science was thought to be necessarily a matter of

large ships and great sums of money; therefore the affair of national governments chiefly. And we have to thank Helland-Hansen and the other Scandinavian oceanographers for our present realization that physical and chemical work of the most exacting kind can be done on the high seas on small craft; that the use of sails on oceanographic ships is not obsolete, but may be of high advantage. Trained in a hardy school on the little research steamer *Michael Sars* under Johann Hjort (Agassiz medalist also) and Captain Iversen, Helland-Hansen in 1914 announced to the oceanographic world the launching, the year before, of the still smaller auxiliary ketch *Armauer Hansen*, and of her maiden cruise. It was not long before the fame of this little craft, only 73 feet long, and of her commander, Helland-Hansen, spread far and wide; her voyages crisscrossed the Norwegian sea and northeastern Atlantic; to Iceland; to Portugal; to Morocco; to the Azores. So successful indeed was she, and such a wealth of contribution came from her cruises, that she has served as a model for other research ships; most recently for our own slightly larger *Atlantis*. We thank Helland-Hansen for the fact that these little vessels go and come on the open ocean, carrying on their work with the highest standard of precision, in foul weather as in fair, accumulating threads of data from which a fabric of modern sea science is being spun.

OBITUARY

CARL EWALD GRUNSKY

IN the passing of Dr. C. E. Grunsky, the scientific world has lost an indefatigable worker, a man possessed of a happy combination of faculties which fitted him especially for the rôle he chose to follow. Primarily a civil engineer of renown, his interests were broad and his activity great. He became associated with the California Academy of Sciences in 1896 as a member and served on the Board of Trustees from 1898 to 1904. In 1911 he became corresponding secretary and was elected president in 1912, a position he held until his death. In addition he acted as director of the Museum of the Academy and the Steinhart Aquarium from 1932, succeeding the late Dr. Barton Warren Evermann. He became a patron on May 21, 1934.

He was born in San Joaquin County, California, on April 4, 1855, and attended the public schools of Stockton. In 1872 he went to Germany, thinking of medicine as a career, but changed to civil engineering, which he studied at the Realschule and Polytechnikum at Stuttgart. He graduated from the latter in 1877 and was given the Dr.Ing. degree in 1910. The same honor was received from Rensselaer Polytechnic Institute in 1924. Standard works of reference show the many positions of trust which he held in engineering circles; he was city engineer of San Francisco, 1900–1904; member of the Panama Canal Commission, 1904–1905; consulting engineer, U. S. Reclamation Service, 1905–1907, etc. Much of his life was devoted to matters pertaining to irrigation, drainage and river control.

He received the Norman Medal of the American Society of Civil Engineers in 1910, was vice-president in 1922 and president in 1924. In 1924 he was also president of the Pacific Division of the American Association for the Advancement of Science. He was president of the American Engineering Council in 1930–1931.

One faculty he possessed fitted him particularly for presiding over meetings and groups of people; he was a very clear thinker and could organize his subject-matter rapidly, yet he spoke with deliberation and crisp enunciation.

Political science, particularly those phases dealing with rates, taxation and forms of money, fascinated him and he published extensively on the subject.

He was always interested in art and during his later years found time to paint some of the backgrounds of the habitat groups of African animals now being installed by the academy. His death came suddenly at his home in Berkeley, California, on June 9, while he was mixing pigment and oil.

G. D. HANNA

RECENT DEATHS

GEORGE W. FULLER, consulting engineer of New York City, an authority on municipal sanitation and water supply, died on June 15, in his sixty-sixth year.

DR. CHARLES HENRY GORDON, emeritus professor of geology and mineralogy at the University of Tennessee, died on June 12 at the age of seventy-seven years.

DR. ROBERT GIBSON ECCLES, formerly professor of organic chemistry and dean of the Brooklyn College of Pharmacy, for ten years a member of the committee on revision of the U. S. Pharmacopoeia, died on June 9 as a result of injuries received when struck by a trolley car. He was eighty-six years old.

W. L. FOSTER, professor of civil engineering at the Iowa State College, died on May 22, as a result of an automobile accident.

MARCUS E. JONES, explorer, formerly curator in botany at Pomona College, a resident of Salt Lake City, was killed in an automobile accident on June 3. He was eighty-two years old.

SCIENTIFIC EVENTS

CONGRESS OF THE ANTHROPOLOGICAL AND ETHNOLOGICAL SCIENCES[1]

A PRELIMINARY program of the first session of the International Congress of Anthropological and Ethnological Sciences to meet in London under the presidency of the Earl of Onslow from July 30 until August 4 next is now available. The headquarters will be at University College, Gower Street, W.C.2. The inaugural meeting will take place in the Great Hall of the College on July 30 at 3 P. M., when H.R.H. the Duke of York will receive the delegates and declare the Congress open, and Lord Onslow will deliver his presidential address. On the same day at 10 P. M. H. M. Government will hold a reception of the members of the Congress at Lancaster House, St. James's, S.W. The business of the congress will be conducted in general and sectional meetings. At the first of the general meetings, which will be held on July 31 at 8:30 P. M., Sir Aurel Stein will deliver the Huxley Memorial Lecture of the Royal Anthropological Institute and will receive the Institute's Huxley Memorial Medal for 1934. At subsequent general meetings in the evenings of the following days, the congress will be addressed by Dr. R. R. Marett, Professor T. C. Hodson and Professor J. B. S. Haldane, each of whom will deal with some one aspect of present tendencies in anthropological studies. Communications addressed to the congress by its members will be submitted to meetings of the sections, of which there will be eight, each one dealing with a major division of the studies with which the congress is concerned.

So far as it is possible to judge from this preliminary outline, the proceedings of the sections will be of the greatest interest. In each section topics of inquiry are suggested, although members are not thereby necessarily precluded from submitting communications on other matters. In the Anatomical and Physical Section, which will meet under Professor Elliot Smith, for example, the central theme will be man's place among the primates. In most sections, however, the range is sufficiently wide to cover all points which members are likely to have time or desire to discuss. Joint meetings between two or more sections occupy a prominent place in the program. The Section of Ethnography, which, naturally, is expected to have the heaviest list of communications, will meet in three divisions, General Ethnography under Dr. A. C. Haddon, African Ethnography under the Rev. E. W. Smith and American Ethnography under Capt. T. A. Joyce. The last named sub-section has been specially arranged with the view of welcoming American workers on their way to attend the International Congress of Americanists to be held later at Seville. It will take as its central theme of discussion the interrelation of pre-Spanish American culture centers and their possible connection with extra-American influences, affording, it is hoped, a welcome opportunity for placing on record the results of the most recent developments in research. In the African Section current problems impinging on questions of administration and the future development of the African will be kept well in view.

[1] From *Nature*.

THE NEW TELESCOPE AT GREENWICH OBSERVATORY

ACCORDING to the London *Times*, appointed visitors of the Royal Observatory, Greenwich, met on June 2 to receive the report of the Astronomer Royal and, this being a special occasion, to take part in the formal inauguration by the First Lord of the Admiralty, Sir Bolton Eyres-Monsell, of the new telescope made possible by a gift of £15,000 from W. Johnston Yapp.

The company included, as members of the official board, Sir Frederick Hopkins, president of the Royal Society; Professor F. J. M. Stratton, president of the Royal Astronomical Society; Sir William Bragg, Professor Alfred Fowler, Sir James Jeans, Sir Joseph Petavel, Sir Napier Shaw, Professor Sydney Chapman, Sir Gerald Lenox-Conyngham, Professor H. F. Newall, Professor H. H. Plaskett (Oxford University Observatory), Sir Arthur Eddington and others well known in astronomical and official circles. They assembled outside the building that houses the new telescope, which is not within the boundary of the observatory proper, but in an enclosure of the Park, about 350 yards from it, towards the top of Maze Hill, that was added to the domain of the Astronomer Royal in 1898 for the purposes of magnetic work.

Owing to the extended use of electricity near Greenwich, it was found advisable some years ago to establish a magnetic observatory at Abinger, Surrey, as an adjunct to the Royal Observatory, leaving the space in Greenwich Park available for the new telescope. There is enough room also in the enclosure for a reversible transit circle that is being made by Messrs. Cooke, Troughton and Simms for the observatory, the housing for which, semi-cylindrical in shape, constructed by the Cleveland Bridge Company, was on view.

In his speech, as reported in the *Times*, the Astronomer Royal, Dr. H. Spencer Jones, said:

> that they were celebrating 259 years of the Royal Observatory. It was some 40 years since the observatory last had a gift of a large telescope, but never before had it had the gift of a telescope and a building ade-

quate for it such as had been presented through the generosity of Mr. Yapp. The first Astronomer Royal, Flamsteed, was appointed at a salary of £100 a year, out of which he had to provide his own instruments. The new instrument had a larger aperture and a greater light-collecting power than any other instrument the observatory possessed. It was about as large as could be used with advantage in the English climate.

The telescope had been presented in commemoration of the work of Sir Frank Dyson as Astronomer Royal in directing the work of the observatory for nearly twenty-five years. During the war came the development of the generalized theory of relativity. That could only be tested by astronomical observations, and, in particular, one of the most important tests could only be made at the time of the total eclipse of the sun.

Sir Frank Dyson knew that this was to happen in May, 1919, and that it would possibly be the most favorable opportunity for making that particular test. It was then about the darkest time in the whole of the war. But not daunted by that, he set to work immediately to prepare plans and organize expeditions, so that if the war ended in time those expeditions could be sent out. As a result they did go, one from that observatory and one from Cambridge, and brought back results which settled conclusively that the predictions of the generalized relativity theory were practical.

THE LEON MANDEL GUATEMALA EXPEDITION OF THE FIELD MUSEUM

KARL P. SCHMIDT, F. J. W. Schmidt and Daniel Clark, who returned in April from Guatemala, to the Field Columbian Museum, Chicago, report the success of several of the objects of the Leon Mandel Guatemala Expedition. Emmet R. Blake, ornithologist, remained in the field until June 1 in order to conclude studies on the distribution of Guatemalan birds.

According to the *Bulletin* of the Museum, the expedition obtained specimens and accessory material for exhibition groups of three of the most characteristic and interesting of Central American birds—the toucans, the giant oriole, and the quetzal. Two species of toucans, with their brilliant colors and grotesquely enlarged beaks, were found feeding in great flocks on fruit trees in the forest. The giant orioles drape whole trees with their woven hanging nests which are from three to six feet in length. Their colonies are a remarkable feature of the tropical landscape, and specimens of the nests as well as the birds were collected. Special permission was granted by President Jorge Ubico, of Guatemala, to collect the quetzel, which enjoys special protection as the national bird of Guatemala. This most brilliant of all the trogons was formerly so persecuted for its plumes that it has become one of the rarest of birds. Specimens were found in the cloud forest on the slopes of the Volcano Tajumulco in western Guatemala, and a small series was collected for the exhibit planned for the Proposed Hall of Foreign Birds.

The scientific results of the expedition in the accumulation of representative collections from this rich territory are as valuable as the materials obtained for the exhibition halls. The collection of reptiles and amphibians will enable Assistant Curator Karl P. Schmidt to conclude his project for a comprehensive list of the Central American forms undertaken under the joint auspices of Field Museum and the John Simon Guggenheim Foundation.

Specialization on certain groups of small mammals and the employment of a wide variety of methods of collecting produced interesting results, especially with bats and certain rodents. The collections of these mammals obtained by Mr. F. J. W. Schmidt include some of the rarest of Central American species as well as several forms hitherto unknown.

Previous expeditions to Guatemala under the auspices of the Field Museum worked in limited areas. The larger personnel of the present expedition has made possible more comprehensive work in this territory.

THE ESTABLISHMENT OF A WILD-LIFE DEMONSTRATION AREA

PREPARING to set landowners an example in wild-life restoration, the U. S. Department of Agriculture has decided to devote 800 acres on its Beltsville (Md.) Experiment Station to the development of wild-life resources and the demonstration of management practises. The Bureau of Biological Survey will be in charge.

Typical of areas on many farms, the tract comprises cultivated sections, abandoned crop lands, timber and marshes. A small stream with several branches runs through the area. Already there are foxes, opossums and raccoons; squirrels, rabbits and other rodents on the tract. More than fifty species of birds nest there.

In treating this tract as a demonstration area the Biological Survey plans to construct two simple dams that will impound water for wild fowl and also for muskrats and beavers. Wild-life food plants found on the area will be encouraged, others have been planted, and studies will be made of other means for the restoration, increase and conservation of the wild life of the region.

The department in its program of demonstrating wild-life management is first appraising conditions on the area. Soil-cover (including cover for game) and soil surveys have been made, and a topographic survey is nearing completion. Results of these surveys are being recorded on maps.

The bureau is taking a census of the wild life on the tract. Soon after the demonstration area was established, Arthur H. Howell, of the survey, counted the

birds. Based mainly on the songs of the males, his estimate showed that the breeding birds on these 800 acres include about 275 pairs of 51 species. In timber Mr. Howell noted 159 pairs of 28 species. In grassy fields he counted 38 pairs of 13 species. Slashings, he found, contained 42 pairs of 5 species; 20 pairs of 2 species were in swampy thickets; 12 pairs of 4 species in orchards or dooryards, and one pair in a marsh. Only one species of game bird has thus far been noted—4 pairs of bobwhites breeding in grassy fields.

The bureau has planted lespedeza, soybeans, millet and other food and cover plants to make the area more attractive for upland-game birds. Provision will also be made for propagating these birds in captivity for later release.

The two ponds for waterfowl to be created by building dams will be about a mile apart. The impounded water in each case, it is expected, will cover 18 acres.

By impounding water the bureau will also furnish suitable surroundings for muskrats and beavers—valuable fur bearers that contribute to the income of farms where they are encouraged. At the site of one of the projected ponds, workers have planted willows to furnish food for beavers, and additional provisions will be made for improving the food supply for fur animals. The area will include units for the production of fur animals in captivity.

The demonstration area will also serve as a wild-life experiment station. The results, it is expected, will be of value not only to farmers undertaking game management, but also to federal and state agencies in the administration of wild-life refuges. Specialists of the bureau will experiment with various methods of game-management and will study the factors influencing the abundance of wild life—including predators, rodents and diseases. Plans are being made for a central laboratory for detailed investigations, and provision will be made for keeping birds and animals under observation. This tract is typical of the areas on thousands of farms, and the bureau intends to show how such a piece of land can be made of great value in furthering the national program of wild-life restoration.

THE NATIONAL RESEARCH COUNCIL OF THE PHILIPPINE ISLANDS

THE National Research Council of the Philippine Islands was created in 1923 by the Philippine Legislature, under Act 4120. The council has been constituted as follows:

EXECUTIVE BOARD

Chairman: Dr. Manuel L. Roxas, under-secretary, Department of Agriculture and Commerce, Commissioner of Research, acting director, Bureau of Plant Industry.

Vice-chairman: Dr. Bienvenido M. Gonzales, dean, College of Agriculture, University of the Philippines.

Executive Secretary: Dr. Patrocinio Valenzuela, associate professor, School of Pharmacy, University of the Philippines.

Members: Arthur F. Fischer, director, Bureau of Forestry; acting director, Bureau of Science; *chairman,* Division of Agriculture and Forestry. Dr. Eduardo Quisumbing, chief, National Museum, and curator, Philippine National Herbarium, Bureau of Science; *chairman,* Division of Biological Sciences. Angel S. Arguelles, assistant director, Bureau of Science; *chairman,* Division of Chemical and Pharmaceutical Sciences. Hermenegildo B. Reyes, professor of mechanical and electrical engineering, College of Engineering, University of the Philippines; *chairman,* Division of Engineering and Industrial Research. Dr. Antonio G. Sison, professor of medicine, College of Medicine and Surgery, University of the Philippines; *chairman,* Division of Medical and Veterinary Sciences. Dr. Victor Buencamino, director, Bureau of Animal Husbandry; *chairman,* Division of Government, Foreign and Educational Relations. The Reverend Miguel Selga, director, Weather Bureau; *chairman,* Division of Physical and Mathematical Sciences.

SCIENTIFIC NOTES AND NEWS

DR. JOSEPH S. AMES, president of the Johns Hopkins University, formerly professor of physics and for four years provost of the university, has announced his intention to retire at the close of the next academic year.

DR. JAMES SOMERVILLE MCLESTER, professor of medicine at the University of Alabama, was chosen at the recent Cleveland meeting president-elect of the American Medical Association by a margin of fourteen votes. Dr. McLester received eighty-five votes in the House of Delegates against seventy-one for Dr. Hugh S. Cumming, surgeon-general of the United States. Dr. McLester will take office next year, succeeding Dr. Walter L. Bierring, of Des Moines, who was elected a year ago. Dr. Dean DeWitt Lewis, surgeon-in-chief of the Johns Hopkins Hospital and professor in the university, was the retiring president.

ADDITIONAL members of the Science Advisory Board, created by an executive order of President Roosevelt on July 31, 1933, have been appointed as follows: Dr. Roger Adams, president-elect of the American Chemical Society, professor of organic chemistry and chairman of the department of chemistry of the University of Illinois; Dr. Simon Flexner, director of the labora-

tories of the Rockefeller Institute for Medical Research; Dr. L. R. Jones, professor emeritus of plant pathology at the University of Wisconsin; Dr. Frank R. Lillie, dean of the Division of the Biological Sciences of the University of Chicago; Dr. Milton J. Rosenau, professor of epidemiology at the Harvard School of Public Health, and Dr. Thomas Parran, state commissioner of health of New York.

AT a recent convocation at the University of Oxford the honorary degree of doctor of science was conferred on Dr. Edwin P. Hubble, astronomer of the Mount Wilson Observatory.

AMONG the honorary degrees conferred by Yale University on June 20 were the doctorate of laws on Dr. James Bryant Conant, of Harvard University, and the doctorate of science on Dr. Frederick G. Keyes, professor of physical chemistry at the Massachusetts Institute of Technology, and on Dr. Adolf Meyer, psychiatrist in chief at the Johns Hopkins Hospital.

THE honorary degree of doctor of science was conferred on Barnum Brown, curator of vertebrate paleontology at the American Museum of Natural History, at the commencement exercises of Lehigh University.

AT the closing exercises of Acadia University, Wolfville, Nova Scotia, held on May 23, the honorary degree of doctor of science was conferred on the following alumni: Dr. George Russell Bancroft, professor of physiological chemistry and toxicology at Jefferson Medical College, Philadelphia; Dr. John Stuart Foster, professor of physics at McGill University, and Dr. Frederick Shand Goucher, research physicist at the Bell Telephone Laboratories, New York City.

A LUNCHEON in honor of the seventieth birthday of Dr. Frank M. Chapman, curator of birds at the American Museum of Natural History, was given on June 13 by his associates, seventy-five of whom were present. Dr. Chapman has been connected with the museum for forty-seven years.

AN album of letters from some five hundred friends and alumni expressing appreciation of his work and of his contributions to agriculture was recently presented to Dr. Charles Franklin Curtiss, who retired in 1932 as dean of agriculture at the Iowa State College and director of the Experiment Station. An oil portrait of Dean Curtiss, painted by Robert Grafton, of Chicago, will be presented to the college.

On the occasion of the resignation of Dr. D. Clifford Martin, for twenty years chief of the tuberculosis Bureau of the New York City Department of Health, a dinner was given in his honor by two hundred of his friends and associates. Among the speakers were Health Commissioner John L. Rice, Dr. James A. Miller and Dr. William H. Park.

Industrial and Engineering Chemistry reports that to commemorate the fiftieth anniversary of the scientific activity of Nicholas D. Zelinsky, professor at the State University, Moscow, U. S. S. R., and member of the Academy of Sciences, a celebration was held in Moscow on June 8. Professor Zelinsky is known for his work in the field of the hydrocarbons.

THE gold medal of the American Medical Association has been awarded to Dr. Gregory Shwartzman, of Mt. Sinai Hospital, New York, in recognition of his method of producing an antitoxin serum for typhoid fever.

DR. WILLIAM SNOW MILLER, emeritus professor of anatomy at the University of Wisconsin, was awarded the Trudeau medal at the thirtieth annual meeting of the National Tuberculosis Association, held at Cincinnati.

THE following awards are reported in *Nature* to have been made by the Royal Aeronautical Society, London: Simms Gold Medal to Sir Gilbert Walker, for his paper on cloud formation; Taylor Gold Medal to A. Plesman, managing director of K.L.M., for his paper on the Amsterdam-Batavia service; the Wakefield Gold Medal to Señor J. de la Cierva, for his work on the development of the autogiro; the Busk Memorial Prize to A. V. Stephens, for his paper on recent research in spinning, and the Pilcher Memorial Prize to W. H. Lewis, for his paper on duralumin in aircraft construction.

AT the Johns Hopkins University, Dr. Allen W. Freeman has been appointed dean of the School of Hygiene and Public Health for three years from July 1. He succeeds Dr. Wade H. Frost, professor of epidemiology. Dr. Edward W. Berry, professor of paleontology, has been reappointed dean of the College of Arts and Sciences for a term of five years. Other appointments include Dr. Edward H. Hume, Noguchi lecturer; Dr. Pasteur Valery-Radot, of Paris, Thayer lecturer in the School of Medicine, and Dr. Julius Lewy, formerly of the University of Giessen, visiting professor in the Oriental Seminary for the first term. Dr. Alan C. Woods, formerly associate professor of ophthalmology, has been appointed acting professor of ophthalmology, and Dr. Ludwig Edelstein, formerly of the University of Berlin, associate in the history of medicine.

DR. IVEY FOREMAN LEWIS, professor of biology at the University of Virginia, has been elected dean of the university, and Dr. George Oscar Ferguson, Jr., professor of psychology and education and assistant dean of the College of Arts and Sciences, has been made dean. Dr. Gordon Thomas Whyburn, associate professor of mathematics at Stanford University, has been elected professor of mathematics, and Dr. Albert

Eugene Carey, since 1927 assistant in experimental pathology with the Rockefeller Institute for Medical Research, associate professor of pathology.

WALTER G. WHITMAN, associate director of research of the Standard Oil Company of Indiana, has been appointed head of the department of chemical engineering at the Massachusetts Institute of Technology. Professor Whitman succeeds the late Professor William P. Ryan, who died in June, 1933. Since that time, Dr. Warren K. Lewis has directed the affairs of the department as acting head.

DR. LLOYD A. YOUNG, research assistant in theoretical physics at Princeton University, formerly National Research Fellow at Harvard University and the Massachusetts Institute of Technology, has been appointed instructor in theoretical physics at the Carnegie Institute of Technology, Pittsburgh. Dr. Young will work under the direction of Dr. Otto Stern, head of the physics research laboratory.

DR. FRANZ BLUMENTHAL, formerly surgeon at the Institute of Dermatology of the University of Berlin, arrived in New York on June 1. He will lecture at the University of Michigan and plans to continue there his work on the treatment of skin diseases.

DR. BERNARD L. OSER, of the Food Research Laboratories of New York City, has been promoted to the position of director of that organization.

DR. HAROLD LEVINE, research associate at the South Carolina Food Research Laboratory and lecturer on nutrition at the Medical College of the State of South Carolina, will join the Premier-Pabst Corporation of Milwaukee as biochemist.

H. A. BALLOU retired recently as commissioner of agriculture for the British West Indies and head of the department of zoology and entomology in the Imperial College of Tropical Agriculture.

DR. L. M. DENNIS, emeritus professor of chemistry at Cornell University, sailed for Europe on June 6.

DR. CAROLINE E. FURNESS, professor of astronomy at Vassar College, has leave of absence for the coming academic year.

DR. STANLEY T. BROOKS, curator of recent invertebrates at the Carnegie Museum, Pittsburgh, will sail in June for several months collecting in Newfoundland. The trip is for the purpose of studying the circumpolar and nearctic molluscan fauna, although collections of plants and insects will be made.

THE Secretary of State has designated Professor George Grant MacCurdy, of Yale University, as an official delegate of the United States to the first session of the International Congress of Anthropological and Ethnological Sciences to be held in London from July 30 to August 4. He will also represent the Smithsonian Institution at the congress. Dr. MacCurdy, as director of the American School of Prehistoric Research, will consult with Theodore McCown, of the University of California, and Sir Arthur Keith, who are studying and preparing for publication the ten Neandertal skeletons recently dug from caves at the foot of Mount Carmel, Palestine, by the joint expeditions of the American and British schools.

DR. R. E. ROSE, director of the Technical Laboratory of the E. I. du Pont de Nemours and Company, Incorporated, and president of the American Association of Textile Chemists and Colorists, addressed the Technical Association of the Pulp and Paper Industry in Philadelphia on May 25 on "Developments in the Technology of Cellulose."

DR. LAURENCE H. SNYDER, of the Ohio State University, delivered an address before the Society of Sigma Zeta at Otterbein College on May 18. His subject was "Heredity and Modern Life."

DR. WALDEMAR KAEMPFFERT, science editor of *The New York Times*, gave the address at the commencement exercises of the Carnegie Institute of Technology on June 11.

HOWARD T. BLAKESLEE, science editor for the Associated Press, was the speaker on June 5 at the graduation exercises of the Massachusetts Institute of Technology.

THE Academy of Natural Sciences, Philadelphia, is sending an expedition to the Republic of Mexico, under a grant from the American Philosophical Society. The members of the party, which left Philadelphia on June 12, are Dr. Henry A. Pilsbry, curator of mollusks, and Dr. Francis W. Pennell, curator of plants, in the Academy, and Cyril H. Harvey, teacher of natural science in the Friends School in Atlantic City. They will spend three months in the field, carrying on their investigation in the high plateau of central Mexico, and securing mollusks and plants for the collections of the academy.

THE exhibition of machine art recently held in New York City will be placed on display at the Museum of Science and Industry in Jackson Park, Chicago, from June 25 to November 15. The exhibition is a collection of manufactured articles which combine beauty and utility, gathered together by the Museum of Modern Art in New York and sent to Chicago.

THE twenty-sixth annual session of the University of Michigan's Biological Station at Douglas Lake, thirteen miles from Cheboygan, will open on June 25.

DR. JAMES P. CHAPIN, of the American Museum of Natural History, has transmitted to The New York

Botanical Garden the extensive botanical collections made by him on Mount Ruwenzori, Mount Kenya, and Kivu Volcano, in central Africa, and in the Lukolela region of Belgian Congo in 1926–27 and 1930–31.

GROUND-BREAKING ceremonies for the Hayden Planetarium of the American Museum of Natural History, which is to be constructed just north of the museum buildings, took place on May 28. Contract for constructing the planetarium building has been awarded to the White Construction Company of New York, whose bid, which was the lowest, was $509,144. All funds for the construction and incidental equipment will be obtained through a $650,000 bond issue purchased by the Reconstruction Finance Corporation and to run for a period of twenty years. The Zeiss projection planetarium apparatus and the Copernican Planetarium will be acquired through the gift of $150,000 of Charles Hayden, after whom the planetarium has been named. Mr. Davison presided at the ground-breaking ceremonies. The speakers were Mr. Hayden, who turned the first spadeful of soil; Park Commissioner Robert Moses, representing the city, and Dr. Clyde Fisher, curator of astronomy at the museum. It is expected that about a year will be taken to complete the planetarium. An admission charge will be made until the money borrowed from the federal government has been paid, but public school children attending classes are to be admitted free at special periods.

THE voices of Dr. William L. Bragg and Sir Arthur Stanley Eddington, visiting lecturers at Cornell University, have been recorded as part of an arrangement to preserve for future generations the voices of distinguished persons connected with Cornell. Professor Vladimir Karapetoff, of the school of electrical engineering at Cornell, has volunteered to make the records on his high-fidelity voice recording equipment perfected after several years of experimenting. Dr. Bragg's statement opened as follows: "This is W. L. Bragg speaking, of Manchester University, England, on May 3, 1934. I am often confused with my father, Sir William Bragg, greatly to my own advantage, since we are both professors of physics and have worked together at the same branch of research in the investigation of crystal structure by means of x-rays. We started this research in 1913 and were awarded the Nobel Prize for it jointly two years later." Sir Arthur introduced himself in these words: "This is Sir Arthur Eddington speaking on May 1, 1934. I have been visiting Cornell University to give the Messenger lectures for this year. I have been for twenty years professor of astronomy in the University of Cambridge, England, and am director of the observatory there. When I am not occupied with the stars, I am generally occupied with Einstein's theory or with some of the developments of theoretical physics that have arisen out of it."

FOR the first time in a century there are new-born musk-oxen in Alaska, according to a report to the Bureau of Biological Survey, U. S. Department of Agriculture. Two young animals were born April 29 in the herd transplanted to the territory in 1930. Musk-oxen, according to statements by natives, practically disappeared from Alaska about one hundred years ago, and there seem to be no authentic records of their existence there until the fall of 1930. In April, 1927, the Territorial Legislature in a memorial to Congress urged an appropriation for re-establishing musk-oxen in Alaska, and the Bureau of Biological Survey undertook the task. Thirty-four young musk-oxen were transplanted from northeastern Greenland to the territory in the summer and fall of 1930. These were captured by a Norwegian collector, and after transshipment in Norway traveled on an ocean liner to New York. They were subsequently placed on a suitable range, and although there have been a few casualties, the herd has prospered.

DISCUSSION

THE "SINKING" OF LAKE AND RIVER ICE

IN the spring, as Tennyson puts it, some of us are prone to obsessions. One of these obsessions is that of the boatman, fisherman and lots of others, who swear that at this season surface ice becomes rotten or honeycombed, and sinks. They know it sinks, because in the evening the lake, for instance, may be covered with a sheet of old ice from end to end and shore to shore, and by the next morning no trace of the ice left, save little patches here and there along the water's edge. "Of course it sank," they say, "how else could it have disappeared so rapidly?" And river men tell us not to worry about the ice coming down stream from a broken jam above, for before getting very far it will go to the bottom like a rock. Evidently it can be sunk, and sometimes is, just as a boat may be, by overloading with a substance denser than water, such as sand, gravel or mud. But as this requires one pound of sand, for example, to every 7 pounds of ice, a proportion hundreds of times greater than that of the suspended matter to the water in even a muddy river, it is obvious that such sinking can not occur on lakes, except rarely at the mouths of flooded streams, nor at all commonly anywhere else.

This sinking by overloading every one admits. The argument, and need for explanation, comes when it is

insisted that honeycombed ice, wherever it may be, sinks like water-logged wood, and perhaps for the same reason.

This is too much for the physicist to take "lying down," for he refuses to believe that anything 10 per cent. lighter than water, as ice is, actually does or can sink in that water, whatever it may seem to do in the eyes of no matter how many witnesses. However, the ice does disappear. If it doesn't sink it must melt, but then how can it all melt in a few hours in the same water in which it had remained for weeks without melting?

To simplify the problem consider the behavior of ice on a lake of moderate size in a region where the water remains frozen over through the winter. The matters of importance are:

(1) When winter approaches the surface water cools, becomes denser and sinks until from bottom to top the water has the temperature appropriate to its maximum density, that is, 39° F., very nearly.

(2) As the surface water is further cooled it becomes lighter and remains at the top where, presently, it freezes to ice, and in so doing expands by about one tenth its original volume, and thus becomes approximately 10 per cent. lighter in the solid form than it was while in the liquid state. Hence it floats.

(3) In the process of freezing the dissolved substances in the water (in lake and stream water there always are such substances) are at first expelled by the forming ice, and later entrapped, in part, in the water between the crystal faces or in crevices of whatever kind.

(4) With a little further cooling this interfacial and cavity concentrate, which always has a more or less lower freezing point than pure water, also is frozen and the sheet of ice thus rendered continuous and solid throughout, save for such air bubbles as may be present.

(5) Under the influence of moderating weather and increasing sunshine as the spring days lengthen, the ice slowly warms up until its least pure portions, that is, those in the crystal cavities and over the crystal faces, melt—melt at a small fraction of a degree, often as little as one thousandth of a degree, perhaps, below the freezing point of the purer ice. When this happens the bricks (crystals) still are solid, but the mortar that bound them together is fluid, and the whole structure weak. The ice has become rotten, as generally expressed, and soon more or less cracked, honeycombed and water-logged. This last condition is partly, at least, caused by top-surface melting, and rain, perhaps.

(6) Even yet there has been very little melting at the under surface of the ice because there the water, being in contact with ice, is at the freezing (or melting) temperature, 32° F. And because, owing to protection from winds by the sheet of ice, there is no wave action to bring up the denser, *warmer* water from below.

(7) Comes a storm. The weak ice starts to break and soon is extensively broken. Then the churning action of the waves brings up an abundance of water of several degrees higher temperature than the melting point, and in the course of a few hours, or a day, at most, much of the ice, if not all of it, has melted away—gone so rapidly as to force the belief on most of us that it just must have sunk.

And this is how the ice sinks, "sinks" by melting quickly, on lake and on river, and the only possible way reasonably clean ice can sink. In short, while ice can be sunk by an overload of sand, or other dense material, all moderately clean ice, such as that on lakes, that has "sunk" hasn't sunk at all. It has just melted in a hurry.

W. J. HUMPHREYS
U. S. WEATHER BUREAU

THE OCCURRENCE OF TRUE SPORANGIA IN THE PHYSODERMA DISEASE OF CORN

INCIDENTAL to a series of studies on the morphology and taxonomy of various chytridiaceous fungi, observations were recently made on *Physoderma zeae-madyis*, the causal agent of the serious and widespread "brown-spot" disease of corn prevalent throughout the southeastern states. The immediate concern of the writer was to determine whether the thick-walled, brownish, often elliptical or flattened intramatrical structures, termed by practically all pathologists and mycologists "sporangia," were in reality comparable to the sporangia found in other members of the order.

In addition to the aforementioned spores, which in nearly all species produce at maturity on the host the brownish, powdery pustules or lesions so characteristic of Physoderma infection, at least two species of the genus (*P. butomi* and *P. maculare*) have been found to form also thin-walled, somewhat irregularly shaped, extramatrical sporangia provided with an intramatrical rhizoidal system. These have been referred to as "ephemeral" or "temporary" sporangia. In contrast to the thick-walled, durable resting bodies which are seemingly formed from enlargements of an extensive intramatrical rhizoidal system, the "ephemeral" sporangia are formed from the body of the zoospore itself in the same manner as that found in species of *Chytridium* and *Rhizophidium*.

The purpose of this note is to point out that *Physoderma zeae-madyis* has been found by the writer to produce such extramatrical sporangia in abundance, and from their method of development, he regards them as the true sporangia of the fungus. If zoo-

spores produced upon the germination of the thick-walled resting spores are placed in a hanging drop culture in company with a piece of the unfolding leaf of the corn plant (in this case Golden Bantam) many of the zoospores will eventually come to rest on the surface of the leaf and will develop after three days at 23° C. into somewhat irregular, slipper-shaped structures. These vary considerably in size and are anchored to the host cell by a coarse, branched rhizoidal system of limited extent which arises from a small apophysis. At maturity an innumerable number of zoospores, estimated in some instances to be in excess of 300, are formed within this sporangium and are ultimately discharged through a broad pore formed after the deliquescence of a single apical papilla. These spores are similar to those produced by the germinating resting spores but are markedly smaller (gametes?). After discharge, another and often a third sporangium may be formed within the original one. Similar sporangia have also been observed by the writer to be formed by *Physoderma menyanthis*.

Not only do these observations seem of interest from a purely mycological standpoint in establishing the fact that *Physoderma zeae-madyis* possesses a sporangial stage comparable to that of certain other genera of the Chytridiales, but it is hoped that they will serve to call attention to a hitherto unsuspected method whereby this exceedingly destructive fungus is quickly and extensively disseminated.

F. K. SPARROW, JR.

DARTMOUTH COLLEGE

GRAPHIC STATISTICS

(1) THE article in SCIENCE for January 12 in which Dr. C. I. Bliss describes the representation of a frequency-distribution[1] is of interest in that it betokens an increasing appreciation of the advantages of this graphic method. The method is hardly new, and in 1930 I described how "the figures of the original table are added up step by step, so as to give the total frequency not exceeding the upper limit of each class interval, and ordinates are then erected to a horizontal base to represent, to a special scale, these integrated frequencies as parts permille; a smooth curve may be drawn through the tops of the ordinates. The special frequency scale is the scale of deviates of the normal curve for each permille of frequency."[2]

Dr. Bliss proposes to multiply these deviates by 1.34_5 and to add 5, so as to transfer the origin from the median to the position defined by the frequency 0.1 permille. This would seem to be a work of supererogation, and I venture to suggest that the use as a scale of frequency of "probits," the arbitrary units derived in this manner, can only lead to needless confusion.

(2) In advocating the use of his table of "probits," Dr. Bliss refers to the greater ease of determining the straight line of best fit by the simple regression equation. In this connection, I would like to invite attention to a graphical method for the determination of a linear function of X approximating to Y for a range of corresponding values (X, Y).[3] The plotted values are divided into two classes by the median of X and the required straight line divides each class into equal numbers. This straight line is unique when the number of values of (X, Y) is $4n+2$ or $4n+3$. In other cases, to avoid ambiguity, the following procedure is suggested[4]: When there are $4n+1$ values, include the median in each class into which it divides the values; when there are $4n$ values, include the two "medians" in each class.

(3) In 1930, when I discussed the graphical representation of a frequency-distribution, I was in ignorance of Mr. Hazen's work[5] and I ventured to suggest the name *Permille* for the special coordinate paper upon which the frequency curves were plotted. It may be of interest to mention that this name is being adopted by the largest publishers of graph paper in England in preference to "arithmetic probability paper."

(4) With a limited number of observations, just as it is more expedient to find the median by inspection without determining classes of equal interval, so also it is more precise, and sometimes easier, to plot a frequency curve directly from the observed values. Furthermore, whatever the number of observations, it is always desirable to plot the outlying values as individual points.

With $(n-1)$ observations, the frequency curve can be drawn by plotting the rth value in order of magnitude against the ratio r/n.[6] This does not appear to be generally known, and Mr. Hazen falls into error in stating (*loc. cit.*, p. 1549) that, if there are 50 terms in the series, the first will be plotted on the 1 per cent. line, the second on the 3 per cent. line, etc.

With nine observations, the values in order of magnitude are plotted against 100, 200, 300, . . . 900 permille. When ninety-nine observations are available, it is generally convenient to plot (on permille paper) every tenth value in order of magnitude together with the five values at each end of the range.

[1] C. I. Bliss, "The Method of Probits," SCIENCE, 79: 38, 1934.

[2] A. F. Dufton, "Graphic Statistics: Permille Paper," *Phil. Mag.*, 10: 566, 1930.

[3] A. F. Dufton, "Correlation," *Nature*, 121: 866, 1928.

[4] A. F. Dufton, "The Reduction of Observations," *Phil. Mag.*, 10: 465, 1930.

[5] A. Hazen, "Storage to be Provided in Impounding Reservoirs for Municipal Water Supply," *Trans. Amer. Soc. Civil Engineers*, 78: 1539, 1914.

[6] A. F. Dufton, "Graphic Statistics," *Proc. Phys. Soc.*, 46: 47, 1934.

(5) In conclusion, may I remark that there appears to be hardly any branch of science in which it would not be helpful to plot frequency-distributions. Such graphical representations not only help to prevent erroneous judgments but, to the practised eye, convey also a wealth of information.

A. F. DUFTON

GREENBANK, GARSTON
HERTFORDSHIRE

A TEST FOR HEAVY WATER IN WATER FROM DEEP OIL WELLS

THE writer has found that the density of water associated with petroleum does not differ from that of ordinary surface water within the limits of measurement, estimated to be not more than two parts per million. The two samples examined were from oil wells slightly more than five thousand feet deep. The geological formation of the source in one case was Oligocene and in the other, Upper Eocene. In each experiment five gallons of water containing oil and water impurities were purified by fractional distillation with the usual precautions and the density of the final sample (800 ml) was determined by the float method of Richards.

The writer is indebted to Mr. George Corless, of the Humble Oil and Refining Company, and to Mr. Gordon B. Hanson, of the Petroleum Rectifying Company, for the collection of the samples.

ARTHUR F. SCOTT

SOCIETIES AND MEETINGS

THE VIRGINIA ACADEMY OF SCIENCE

THE Virginia Academy of Science held its twelfth annual meeting at the State Teachers College at Harrisonburg on May 4 and 5, with a registered attendance of 355.

At the council meeting a resolution was adopted favoring a new and more effective pure food and drugs act. At the open meeting on Friday night Dr. I. A. Updike, of Randolph-Macon College, gave a striking demonstration of the cold-light producing power of 3-aminophthalhydrazide.

The annual prize of fifty dollars was awarded to Dr. E. P. Johnson, of the Virginia Polytechnic Institute, for a paper entitled "The Etiology and Histogenesis of Leucosis and Lymphomatosis of Fowls." Three other papers were such close competitors for the prize that their authors were given honorable mention and a special certificate was issued to each. These were: Mr. Ladley Husted, of the Blandy Experimental Farm of the University of Virginia, "Cytological Studies on the Peanut, Arachis, II. Chromosome Number, Morphology and Behavior, and Their Application to the Problem of the Origin of the Cultivated Forms"; Dr. Rolland J. Main, of the Medical College of Virginia, "Diurnal Changes in Alveolar Carbon Dioxide as Effected by the Visceral Control of Respiration"; and Dr. E. G. Pickels, of the University of Virginia, "Adaptations of the Air-Driven Ultracentrifuge."

The ultracentrifuge developed at the University of Virginia was demonstrated in action and its adaptation to biological research emphasized. This centrifuge runs on and by air and the only practical limit to its speed is the ability of the steel rotor to hold together. A large number of biological exhibits and demonstrations were shown, especially such as could be used in teaching high-school science. There was also a symposium on the teaching of high-school chemistry.

The following officers were elected for the coming year:

President: Dr. William T. Sanger, of the Medical College of Virginia; *President-elect:* Professor Ida Sitler, of Hollins College; *Secretary-Treasurer:* Dr. E. C. L. Miller, of the Medical College of Virginia; *Councilor:* Dr. F. L. Robeson, of the Virginia Polytechnic Institute.

For the Section of Astronomy, Mathematics and Physics: *Chairman,* Dr. C. L. Albright, of the University of Richmond; *Secretary,* Professor Mary J. Cox, of Hollins College.

For the Section of Biology: *Chairman,* Professor Robert P. Carroll, of the Virginia Military Institute; *Sub-Chairman,* Dr. Harry G. Walker, of the Virginia Truck Experiment Station; *Secretary,* Professor George W. Chappelear, Jr., of the Harrisonburg State Teachers College.

For the Section of Chemistry: *Chairman,* Dr. John H. Yoe, of the University of Virginia; *Secretary,* Dr. Robert E. Hussey, of the Virginia Polytechnic Institute.

For the Section of Education: *Chairman,* Dr. W. J. Gifford, of the Harrisonburg State Teachers College; *Secretary,* Professor A. M. Jarman, of the University of Virginia.

For the Section of Geology: *Chairman,* Mr. William M. McGill, of the Virginia Geological Survey; *Secretary,* Dr. Marcellus H. Stow, of Washington and Lee University.

For the Section of Medical Sciences: *Chairman,* Dr. James H. Kindred, of the University of Virginia; *Secretary,* Dr. Harvey B. Haag, of the Medical College of Virginia.

For the Section of Psychology: *Chairman,* Dr. John M. McGinnis, of Hollins College; *Secretary,* Dr. R. C. Sommerville, of Lynchburg College.

The meeting next year will be held the first week in May at the University of Richmond.

Following the meeting there was a geology field trip and the usual botanical foray. About sixty botanists and lovers of nature left Harrisonburg after lunch, Saturday, went to the mountains west of there, spent the night at a Girl Scout Camp and dispersed for home Sunday afternoon. In this way the academy committee on the flora of Virginia is sweeping up various parts of the state.

E. C. L. MILLER,
Secretary

THE OHIO ACADEMY OF SCIENCE

THE forty-fourth annual meeting of the Ohio Academy of Science was held at the Ohio State University, Columbus, on Friday and Saturday, March 30 and 31, under the presidency of Dr. E. Lucy Braun, of the University of Cincinnati. The attendance was surprisingly good, the sectional programs unusually attractive, the enthusiasm refreshing and the cordiality of Ohio State University, as usual, delightful.

About 200 members and visitors sat down to the annual dinner on Friday evening, Dr. A. E. Waller, chairman of the local committee, acting as toastmaster in a very happy manner. Following the dinner, President Braun gave a most informing address on "A History of Ohio's Vegetation," illustrated with a number of excellent lantern slides.

The invitation address was given on Friday morning by Dr. Walter H. Bucher, of the Department of Geology, University of Cincinnati, on the theme "Recent Geologic Methods of Measuring Time." This address was listened to with the closest attention by a crowded house.

The eight sectional programs contained some 145 papers, many of them of outstanding interest.

The Central Ohio Physics Club, Professor G. A. Stinchcomb, of Heidelberg College, president, and Professor R. H. Howe, of Denison University, secretary, again honored the academy by meeting in joint session with the section of physics and astronomy.

Some demonstrations and exhibits of unusual interest were provided for the members of the academy, and provisions were made for a visit to the "Heavy Water" installation of the Ohio State University, also to inspect the work of the departments of agricultural chemistry, chemical engineering, chemistry, ceramics and metallurgy. The officers and staff of the Battelle Memorial Institute extended an invitation to visit the institute under guides and at the same time inspect the exhibits of the department of chemical engineering, including (a) nomographic charts in the rayon industry, (b) fineness determination of Portland cement, etc., and (c) classification of limes.

Twenty-eight new members were elected and the following members were made fellows in the Academy: Stanley Adair Cain, Wendell Holmes Camp, Arthur Glenn Chapman, Ray Clarence Friesner, Robert Benson Gordon, Lawrence Emerson Hicks, Paul Jackson Kramer, Clarence J. Leuba, Melvin Gillison Rigg, Hiram Frederick Thut and Harry Ellsworth Nold.

The following were elected to office for the ensuing year: *President,* James P. Porter; *Vice-presidents,* (A) Zoology, Robert S. McEwen; (B) Botany, O. L. Inman; (C) Geology, Willard Berry; (D) Medical Sciences, J. B. Brown; (E) Psychology, Francis N. Maxfield; (F) Physics and Astronomy, C. E. Howe; (G) Geography, G. W. Conrey; (H) Chemistry, Clyde S. Adams; *Secretary,* William H. Alexander; *Treasurer,* A. E. Waller.

WILLIAM H. ALEXANDER,
Secretary

REPORTS

APPROPRIATIONS FOR GRANTS-IN-AID BY THE NATIONAL RESEARCH COUNCIL

THE Committee on Grants-in-Aid of the National Research Council, at its meetings in May and June, out of 142 requests made sixty-six grants for the support of research projects, as follows:

Physical Sciences: Sebastian Albrecht, research associate, Dudley Observatory, "accurate stellar wave-lengths and standard radial velocities"; M. L. Pool, assistant professor of physics, Ohio State University, "disintegration of the lighter elements with low voltage bombardment and the examination of the products of the disintegration with a low pressure Wilson Cloud Chamber"; P. A. Ross, professor of physics, Stanford University, "scattered x-rays"; Charles H. Smiley, assistant professor of mathematics, Brown University, "tables of orbital coordinates for nearly-parabolic orbits"; Otto Struve, director of the Yerkes Observatory, and S. L. Boothroyd, professor of astronomy, Cornell University, "development of the technique of coating large optical surfaces with a metal by evaporation in vacuo."

Engineering: Jacob P. Den Hartog, assistant professor of applied mechanics, Harvard University, "relaxation tests in torsion on hollow tubes at high temperatures, and correlation of tests with results of 'creep' tests"; Mortimer F. Sayre, associate professor of applied mechanics, Union College, "types of tests for welding."

Chemistry: Gosta Akerlof, assistant professor of chemistry, Yale University, "measurement over a temperature range of 0° to 100° of the vapor pressure of aqueous solutions of certain strong electrolytes"; W. R. Brode, associate professor of organic chemistry, and W. L. Evans, professor of chemistry, Ohio State University, "absorption spectra of organic and inorganic compounds"; Emma P. Carr, professor of chemistry, Mount Holyoke College, "the absorption spectra of simple or-

ganic compounds in the region 2200–1400 A.''; Thomas DeVries, assistant professor of chemistry, Purdue University, ''the density of gas in the adsorbed state''; Herrick L. Johnston, associate professor of physical chemistry, Ohio State University, ''calculation of thermodynamic properties of gases from spectroscopic data''; Louis Waldbauer, assistant professor of chemistry, State University of Iowa, ''x-ray crystal structure of inorganic compounds''; J. C. Warner, associate professor of theoretical chemistry, Carnegie Institute of Technology, ''the influence of solute molecules upon the vibrational frequencies and intensity of absorption of non-polar solvent molecules''; Roger J. Williams, professor of chemistry, Oregon State Agricultural College, ''chemical isolation of 'pantothenic acid' ''; Don M. Yost, assistant professor of chemistry, California Institute of Technology, ''the thermodynamic constants and molecular configurations of fluorine gas and of fluorides.''

Geology and Geography: Bradford C. Adams, Los Angeles, California, ''the foraminifera of a Pliocene section at Canada de Aliso, Ventura County, California''; Gilbert H. Cady, senior geologist, Illinois State Geological Survey, ''the plant components in Illinois coal''; George B. Cressey, professor of geology and geography, Syracuse University, ''geographic field work in China''; Charles E. Decker, professor of paleontology, University of Oklahoma, ''studies on graptolites''; V. C. Finch, professor of geography, University of Wisconsin, ''preparation of a series of isopleth maps of the United States''; Harold L. Geis, fellow in geology, University of Chicago, ''the taxonomy of the Pennsylvania Ostracods of Illinois''; J. F. Lutz, assistant professor of soils, North Carolina State College of Agriculture, ''physical and chemical properties of soils affecting erosion''; Evans B. Mayo, instructor in petrography, Cornell University, ''the granites of the eastern Sierra Nevadas''; William F. Prouty, professor of geology, University of North Carolina, ''the Silurian deposits of eastern Tennessee''; Parry Reiche, fellow in geology, University of California, ''the lithology, structure and sequence of the Sur Series of California at its type locality''; Francis P. Shepard, assistant professor of geology, University of Illinois, ''the submarine canyons off the California coast''; C. Warren Thornthwaite, assistant professor of geography, University of Oklahoma, ''the climatic basis of forest distribution in eastern North America''; Samuel Weidman, professor of geology, University of Oklahoma, ''dolomitization, silicification and related phases of mineralization associated with the zinc-lead ore deposits of the Tri-State district''; E. P. Wheeler, 2nd, Ithaca, New York, ''a study of the anorthositic rocks in the vicinity of Nain, Labrador''; George W. White, assistant professor of geology, University of New Hampshire, ''mapping of the Wisconsin-Illinoian glacial boundary in north and west central Ohio, by a study of soil minerals.''

Medical Sciences: Joseph D. Aronson, assistant professor of bacteriology, Henry Phipps Institute, ''the mutual effect of tuberculosis and syphilis in experimental animals''; Henry G. Barbour, associate professor of pharmacology and toxicology, Yale University, ''relation of the pituitary gland to water shifting reflexes in primates''; Detlev W. Bronk, professor of biophysics, University of Pennsylvania School of Medicine, ''properties and functions of the sympathetic ganglia''; Samuel J. Crowe, professor of otology and laryngology, Johns Hopkins University Medical School, ''the physiology of the middle ear''; J. A. E. Eyster, professor of physiology, University of Wisconsin, ''the electrical field around the contracting heart and skeletal muscle, and related phenomena''; E. M. K. Geiling, associate professor of pharmacology, Johns Hopkins University Medical School, ''histological and pharmacological study of pituitary glands of whales, porpoises and seals''; Arthur Grollman, associate professor of pharmacology and experimental therapeutics, Johns Hopkins University Medical School, ''chemical study of the adrenal cortical hormone''; Harold E. Himwich, associate professor of physiology, Yale University School of Medicine, ''interrelated aspect of carbohydrate metabolism''; Richard U. Light, research assistant, Yale University School of Medicine, ''development and standardization of a new apparatus for the investigation of neurological function''; F. A. McJunkin, professor of pathology, Loyola University School of Medicine, ''extraction and purification of agents that inhibit mitotic proliferation in the kidney''; George C. Shattuck, assistant professor of tropical medicine, Harvard University Medical School, ''effects of heat, *i.e.*, sun-stroke and heat-exhaustion''; William F. Windle, associate professor of anatomy, Northwestern University Medical School, ''development of behavior in the embryo correlated with the development of intrinsic structure of the nervous system.''

Biological Sciences: E. Lucy Braun, associate professor of botany, University of Cincinnati, ''the relationship of climax associations of the deciduous forest formation''; H. S. Fawcett, professor of plant pathology, University of California, ''a comparative study of the parasitic action of certain strains of the fungus *Trichoderma* against the fungus *Rhizoctonia solani*''; Herbert C. Hanson, professor of botany, North Dakota Agricultural College, ''the relation of vegetation to soil types in grassland areas''; Walter N. Hess, professor of biology, Hamilton College, ''the islets of Langerhans in the pancreas of rainbow trout and other animals''; Mt. Desert Biological Laboratory, ''chemical stimulation of animals by various substances''; J. G. Needham, professor of limnology and entomology, Cornell University, ''a compendium of culture methods for invertebrate animals''; H. W. Norris, research professor of zoology, Grinnell College, ''the functions of the hypophysis of the Elasmobranch fishes, particularly sharks''; Clayton R. Orton, professor of plant pathology, West Virginia University, ''the dissociation of fusaria in the soil''; Victor E. Shelford, professor of zoology, University of Illinois, ''changes during the past year in abundance of Canadian rodents to discover the effect of their abundance on food supply, and the reasons for their increase or decrease''; Christianna Smith, professor of zoology, Mount Holyoke College, ''histological changes in fetal rats''; Thomas L. Smith, professor of zoology, College

of the Ozarks, "genetics of the wax moth, *Galleria mellonella*"; Carl G. Vinson, professor of horticulture, University of Missouri, "the virus of mosaic disease of tobacco"; Allyn J. Waterman, instructor in biology, Brooklyn College, "progressive organization of mammalian embryos."

Anthropology and Psychology: Clarence W. Brown, professor of psychology, University of California, "the functional relationship between the amount of destruction and the voltage and duration of the current"; Frederica de Laguna, assistant, University Museum, University of Pennsylvania, "an archeological reconnaissance of the lower Yukon, Alaska"; Eugene A. Golomshtok, research associate, University Museum, University of Pennsylvania, "the Old Stone Age in European Russia and Siberia"; J. C. Boileau Grant, professor of anatomy, University of Toronto, "the physical anthropology of the Athapascan Indians of the Mackenzie River Basin"; Melville J. Herskovits, associate professor of anthropology, Northwestern University, "the motor habits of the Negroes of Haiti"; George Herzog, research associate, Institute of Human Relations, Yale University, "interrelation of the poetry, language and music of the Pima Indians of Arizona"; Edmund Jacobson, assistant professor of physiology, University of Chicago, "the influence of neuromuscular relaxation on blood-pressure, and action-potentials in peripheral nerves"; George Kreezer, research associate, The Training School at Vineland, New Jersey, "the coordination of antagonistic muscle groups in spasticity"; R. H. Stetson, professor of psychology, Oberlin College, "acoustic and physiological analysis of the vowel as it occurs in actual speech"; Michael J. Zigler, associate professor of psychology, Wellesley College, "the relationship between qualitative changes in cutaneous sensations and their physiological correlates in human nerve."

The National Research Council will be ready to consider further requests for research grants in the fall. Applications should be filed on blanks which will be furnished by the Secretary of the Committee on Grants-in-Aid on request, and should be filed with the committee before October 15, 1934. Action upon these applications will be taken toward the end of December.

ISAIAH BOWMAN,
Chairman, National Research Council

SCIENTIFIC APPARATUS AND LABORATORY METHODS

A NEWLY DESIGNED TYPE OF STEEL CASE FOR ENTOMOLOGICAL WORKING COLLECTIONS[1]

IT is axiomatic among sportsmen that few men are open to suggestion involving the type of firearms they use. Probably the same degree of settled conviction is true regarding one's camera equipment or its lenses. At least my own experience has taught that few men welcome any suggested change or improvement of their photographic apparatus. Similarly, most museum men become attached to a particular type of housing for the collections in their charge, and are reluctant to consider, much less accept, any alteration of the methods to which they are accustomed. This is natural and to be expected, and in the great majority of instances is fostered by the financial limitations of budgets, which prevent the adoption of a type of housing not readily capable of assimilation and interchangeability with units already in use. However, in the belief that the presentation of practical methods, which have successfully met the requirements of a large museum collection, may be justified, I wish to place before the society a brief description of a new and relatively inexpensive, yet thoroughly modern unit for housing museum study collections of insects.

The older and larger institutions naturally have had broader experience in matters of collection housing than smaller or newer institutions. My own association with museum work at the Academy of Natural Sciences of Philadelphia covers a period of thirty-six years, during which I have seen entomological collections pass from the double book box to the Schmidt box, and then to a larger unit of different type, while the housing of the same went from wooden cupboards by way of the Skinner cabinet of sheet tin, designed by my predecessor, Dr. Henry Skinner, to the modern steel unit I am now describing.

The housing problems our institution encountered were varied, and each department handled its own until the advent of the Cambridge cans for birds and mammals provided the impetus for the development of the Skinner cabinet, which was merely an enlarged Cambridge can provided with a rack to hold twenty-eight Schmidt boxes, or later fourteen glass-top boxes of a larger type. Like the Cambridge cans the Skinner cabinets required a double deck frame or rack for the most economical utilization of the available space. Some few years ago the staff of the Academy seriously undertook the development for each department of housings of automobile body sheet steel, to be lap or spot welded, with outer surfaces flush for the most efficient stacking, and yet with the greatest possible flexibility in the way of utilization, and at prices no greater than we had been paying for less satisfactory cases. The result is that to-day we have developed steel housings, each of special character and with

[1] Address delivered at the annual meeting of the Entomological Society of America, Boston, December 29, 1933, by James A. G. Rehn, of the Academy of Natural Sciences of Philadelphia.

specifically important features, for use in the departments of vertebrate zoology, entomology, mollusks, botany and geology and mineralogy. The entomological unit is the one with which we are now concerned.

The first point the entomologists faced was to design a case using the same type of glass-top wooden box, size 17½ × 13 × 2½ inches, which we had adopted as the standard box unit a number of years ago, and in which we had an investment of many thousands of dollars. These had been used in Skinner cabinets, and it was our intention to transfer them *in toto* to new cases.

The case as perfected is built of standard automobile body sheet steel, bent over templates and lap-welded, with outside dimensions of 77⅝ inches high, 40 inches wide and 14 1/16 inches deep, with double hinged doors opening outward, locking into a central division and at top and bottom by bar locks operated by a T handle on each door. The central division is carried the full depth and height of the case, stiffening it and providing on each side its complement of slide shoulders, which with those on the sides of the case itself provide spaced sections for 48 of the standard boxes, 24 on each side. The doors close on felted surfaces, thus providing with the very tight-fitting box lids double protection against insect pests and dust. These felt strips can be poisoned, if it is thought necessary. The finish of the units, both inside and out, is enamel of the desired color, baked on.

A number of these cases are now in constant service at the Academy and have been found satisfactory in every way. In cost they are quite moderate, considering their sturdiness, efficiency, relatively light weight and ease of operation. They possess all the advantages of the old type wooden cabinet, lack the ponderosity of one of the steel cases now in use in some institutions and have numerous advantages when compared with another smaller unit similarly in institutional use elsewhere. Boxes can not stick or jam in the runways, as they are not in contact; guides or boxes can not swell or stick, as the boxes rest on top of a smoothly enamelled metal shoulder and do not quite touch the one above. Pulls are not necessary on the individual boxes, as ample finger space is provided both above and below each.

The cases now in use at the Academy have been furnished by the Peerless Steel Equipment Company, of Philadelphia, which also supplies our other storage steel cases, as well as steel exhibition cases of unique mechanical construction, designed by members of our staff.

JAMES A. G. REHN
ACADEMY OF NATURAL SCIENCES
OF PHILADELPHIA

SPECIAL ARTICLES

OBSERVATIONS ON ADRENALECTOMIZED, DEPANCREATIZED CATS

OUR attention has just been drawn to a paper by Barnes, Scott, Ferrill and Rogoff in the Proceedings of the Society for Experimental Biology and Medicine (February, 1934). These authors report that if unilateral adrenalectomy is performed in dogs prior to total pancreatectomy, the course of the ensuing diabetes is very mild and comparable to that observed in hypophysectomized, depancreatized animals. Furthermore, unilateral adrenalectomy after total pancreatectomy led in one dog to a reduction to half of the insulin dosage required, while another animal showed only a mild glycosuria with no insulin.

In view of the interest of these results we wish to report our own experiences with cats in which both adrenals and all the pancreas have been removed in stages.

In four cats one adrenal and four fifths of the pancreas were removed at preliminary operations; the remaining portion of the pancreas was grafted under the skin of the abdomen. When the wound was healed and the animal in good health the second adrenal and the pancreatic graft were removed. Administration of liberal doses of a commercial cortical extract were immediately instituted, but at no time was any insulin given. These animals lived 11, 7 and 5 days, while the fourth animal was killed on the seventh day while in good health for liver glycogen determination (2.5 g per cent.).

In another animal (Cat 5) the pancreatic graft became infected. When this was healed it was discovered that the animal was diabetic (fasting blood sugar 180 mgms per cent.). Removal of the graft and the remaining adrenal was carried out as before and the animal lived 11 days.

The behavior of all these animals after the second operation has been identical. They all ate well and did not resemble ordinary depancreatized cats in their clinical course. They died suddenly with convulsions, but for several days before death showed such marked hypoglycemic symptoms that in several instances they had to be resuscitated with glucose. The loss of weight was only moderate and not to be compared with that usually observed in depancreatized animals not treated with insulin.

The most striking findings have been: (a) The fasting blood sugar level. In Cat 1 (lived 11 days) it ranged from 32 to 105 mgms per cent. In Cat 2

(lived 7 days) from 17 to 368 mgms per cent. As well as exhibiting these marked oscillations in blood sugar this animal was resuscitated three times from hypoglycemic convulsions by the administration of glucose. In Cat 3 (lived 5 days) the successive fasting blood sugars were 139, 205, 76, 108 and 190 mgms per cent. In the cat that was sacrificed on the seventh day they ranged from 15 to 180 mgms per cent. (b) The daily glycosuria in all these animals was of a mild nature. The maximum observed in any of them was 4.0 g in one day, while on many days it was completely absent or very slight (0.5 g). When glycosuria was present the $\frac{D}{N}$ ratios were never those of diabetes. Thus with Cat 3, which on one day ingested 20 g pancreas and 134 g of liver and was given 2.5 g of glucose intraperitoneally, the glycosuria was only 0.5 g, which gave a $\frac{D}{N}$ ratio of 0.3. Furthermore, all our animals were in positive nitrogen balance. (c) The administration of glucose gave variable results. In Cat 1, 6 g of glucose by stomach tube led to the excretion of only 0.2 g. In Cat 3, 2.5 g given intraperitoneally caused no glycosuria. On the other hand, intravenous injection of glucose at a rate that normally does not produce glycosuria caused heavy glycosuria in one of the animals (Cat 4). Cat 5 is of especial interest. This is the animal that was diabetic at the time of the second operation. The observations on this cat are recorded in Table I.

We have also made observations on seven cats in which one adrenal was left intact, and the whole pancreas was removed at one operation or in stages. Three of these cats were not treated with insulin after the removal of the graft and died of typical diabetes in 5, 3 and 2 days. The last animal had a severe peritonitis.

The other four were balanced with insulin before the adrenal was removed. In three of these the unilateral adrenalectomy did not reduce the insulin requirement. In the fourth cat all the pancreas and one adrenal were removed at one operation. This animal repeatedly went into shock after two or three units of insulin in spite of the fact that food was given at the time of the injection. To date we have no definite impression that in the cat unilateral adrenalectomy consistently prevents or alleviates the course of pancreatic diabetes. On the other hand, in all our animals complete adrenalectomy has produced a marked amelioration of the usual results of complete pancreatectomy, and this has been observed whether the diabetes had already developed or not.

TABLE I
CAT 5

January 12. Partial pancreatectomy with graft and left adrenalectomy.
January 26. Infection in graft drained.
February 3. Fasting blood sugar 180 mgms per cent.
February 5. Pancreatic graft and right adrenal removed. Weight 2,450 g.

Date	Weight (g)	Carbohydrate from food (g)	Glucose excreted (g)	Blood sugar (mgms per cent.) a.c.	Blood sugar (mgms per cent.) p.c.	
Feb. 6	2400	2.6	2.4	362	—	
" 7	2330	7.2	1.5	282	—	
" 8	2330	7.8	0.7	176	—	3.8 g glucose intraperitoneally
" 9	2500	13.5	4.0	—	80	2.5 g glucose by tube
" 10	2510	4.7	1.1	—	140	2.5 g glucose by tube
" 11	2450	9.1	0.0	106	—	5.0 g glucose by tube 2.0 g glucose intraperitoneally
" 12	2530	24.0	3.2	37	—	3.0 g glucose by tube 2.5 g glucose intraperitoneally
" 13	2320	10.1	1.9	—	208	
" 14	2180	16.3	0.3	124	158	
" 15	2200	17.2	1.4	126	—	
" 16	2170	13.3	0.8	66	—	
" 17	Dead—Blood sugar 11 mgms per cent., Urea N 11.5 mgms per cent.					

We are not entirely satisfied that the dosage of cortical extract was adequate, although supposedly ample amounts were given. We mention this because the animals in many respects have resembled those suffering from adrenal insufficiency.

C. N. H. LONG
F. D. W. LUKENS

GEORGE S. COX MEDICAL RESEARCH INSTITUTE, UNIVERSITY OF PENNSYLVANIA

MICROORGANISMS AND VITAMIN PRODUCTION IN GREEN PLANTS

EARLY in the history of vitamins, investigators on the sources of these essential factors in the food of animals discovered that the animal world has depended upon the plant world for its supply. Even when vitamins were present in animal tissue, they were shown to have originated elsewhere—usually from a vegetable source. But while the sources were investigated and the quantities occurring in plants were determined, while the effects on the body and functions of the animal were observed, and while numerous attempts were made to isolate the vitamins in a pure state, influences which might lead to the formation of these substances received comparatively little attention. Nevertheless, the possible action of microorganisms, both with regard to their capacity to form vitamins themselves and to their effect on the production in green plants, has been recognized.

Even before Drummond and Zilva[1] showed that Vitamin A was concentrated, rather than formed, in the cod's liver, and traced its production through a series of transfers to its ultimate origin in microscopic marine organisms, the suggestion had been made that green plants might not produce the vitamins, but instead might take them up and concentrate them after their formation by bacteria, molds or other microscopic life. A number of investigators have shown that bacteria are able to form vitamins, and Coward[2] in 1925 found that a freshwater alga (Chorella) synthesized vitamin A. Mockeridge[3] suggested that microorganisms liberated "auximones" (growth-promoting substances) from organic matter, which green plants absorbed and which enabled them to form the vitamins.

Recently, Viswa Nath,[4] from experiments in India, has observed that similar plants are markedly different in their content of vitamins (particularly in regard to B, with some indications of the same phenomenon with A), and this difference seemed to depend upon the amount of organic matter available during the growth of the plant. He concluded that bacteria either produced the vitamins from the organic matter and passed them to the plant, or formed some similar substance which plants could use as a stimulant for the vitamin synthesis, although he did not rule out the possibility that plants might form vitamins without these aids. On the other hand, C. H. Hunt[5] in 1927 had checked the vitamin B content of wheats grown on soils for 35 years under varying fertilizer treatments, and had found little difference due to the fertilizers. The quantity of B varied widely from year to year on the same soils, indicating that climate had a decided influence on its formation.

In 1932 Virtanen and v. Hausen in Finnland published a note—"Die Vitaminbildung in Pflanzen."[6] They grew peas under sterile and non-sterile conditions and determined carotin in the plants. No marked difference was found in the quantity formed. An estimation of vitamin C was also made by Tillman's 2.6 dichlorphenolindophenol solution with similar results.

In these laboratories, one of the duckweeds (*Lemna major* or *Spirodela polyrhiza*) has been grown for five years in the absence of microorganisms. These aquatic plants can produce flowers, but usually propagate asexually. They have been grown under sunlight and artificial light, and with or without organic matter.[7] Each frond puts out a new one, which grows to the size of the parent and later separates. The rate of reproduction under uniform conditions, with ample food supply, is logarithmic.

By feeding rats, a comparison was made of the vitamin A content in Lemna produced in a non-sterile mixture of 5 g of soil with 100 cc water, and those grown, free from microorganisms, in a sterile salt solution. The plants were collected each week, air-dried in the dark, and after being finely ground, were included in the basal ration to the extent of 0.5 per cent. dry weight. A third group of rats was fed daily, by hand, a quarter of a gram each of the undried plants from the soil—this provided approximately the same amount of dry matter from the Lemna as that consumed by those eating the dried plants. A fourth group was fed the basal A-free ration as control.

At the time the rats were put on the Lemna additions to the ration they had ceased to increase in weight for several days and had developed marked xerophthalmia. Three of the four controls died before the end of the experiment and the fourth two days later. The xerophthalmia in the group on the dry sterile Lemna cleared up at once and the rats started to gain weight. The average gain for the 24

[1] *Jour. Soc. Chem. Ind.*, 41: 280, 1922.
[2] *Biochem. Jour.*, 19: 240–1, 1925.
[3] *Biochem. Jour.*, 14: 432–50, 1920.
[4] "Some Aspects of Plant Nutrition," Coimbatore, 1932.
[5] *Ohio Agric. Exper. Sta. Bul.*, 415, 1927.
[6] *Naturwissenschaften*, 20: 905, 1932.
[7] Clark, *Jour. Phys. Chem.*, 29: 935–41, 1925.

days was 29 grams for each rat. The growth curve for those on the non-sterile dry plants was closely parallel. The rats fed on the fresh Lemna put on weight faster and gained an average of 37 grams, suggesting that part of the vitamin was destroyed in the drying process.

The equal rate of growth made by the two groups receiving sterile and non-sterile plants not only shows that vitamin A can be formed in plants which have been free from all influence of microorganisms for hundreds of generations, but also is an indication that there is little or no difference in quantity produced. Further, while the non-sterile Lemna were grown by Mr. E. E. Frahm for the most part in sunshine, the sterile plants were produced altogether under artificial light—electric light bulbs in this case furnishing the illumination.[8]

From these results it appears that if conditions are favorable to the growth of green plants, the absence of microorganisms does not affect the formation of vitamin A and also that variation in light within limits has little effect. Virtanen and v. Hausen believe that the form or availability of nitrogen may be one of the controlling factors.

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FUSARIUM BACTRIDIOIDES SP. NOV., ASSOCIATED WITH CRONARTIUM

IN March, 1932, Arthur Hinckley at the Desert Botanical Laboratory, Tucson, Arizona, sent to L. N. Goodding, cooperating with the Oregon Experiment Station, Corvallis, a mummied cone of the Chihuahua pine (*Pinus leiophylla* Schlechtendahl and Chamisso) from the Chiricahua Mountains in Arizona. The cone had been attacked by the cone blister rust (*Cronartium conigenum* Hedgcock and Hunt). Mr. Goodding found this rust to be thoroughly parasitized by a species of Fusarium. The spores of this Fusarium were viable, and cultures were easily obtained from spore dilutions on potato agar. Through the courtesy of S. M. Zeller, Oregon Experiment Station, cultures of Goodding's Fusarium were transmitted to the undersigned, who has found the organism to be a new species in the Section *Discolor*. The diagnostic description is presented as follows:

Fusarium bactridioides Wollenweber, nova species (Sectio Discolor, subs. Trichothecioides): Conidia minora aerio mycelio ex albo incarnato instrata, numerosa, ovoidea v. ellipsoidea, continua 7.3 × 3.7 plerumque 5.9–9 × 3.4–3.9 (5–11 × 3–5), rarius 1–((2–)) sept. 13 × 4.7 pler. 11–14 × 4.2–5.1 (7–21 × 3–6.5), majora in sporodochiis v. pionnote roseo-aurantiaca nec non instrata, pulveracea, incarnata, stromate plus minusve atro-violacea saepe discolorata, alia cylindrica v. fusiformia utrinque obtusa, recta v. curvula, alia fusoideo-subfalcata utrinque ellipsoideo-conica, apice interdum leniter constricta, basi apiculata, raro subpedicellata, 3–5, rarius 6–, rarissime 7–11 septata; 3–sept. 32 × 5.6, pl. 24–26 × 5.2–6 (17–47 × 4.5–7); 5–sept. 41 × 6 pl. 31–60 × 5.5–6.7 (25–60 × 4.8–8); 7–sept. 46 × 6.2 pl. 40–50 × 5.5–6.7 (30–70 × 5–8). Chlamydosporae intercalares sparsae.

Hab. ad conum *Pini leiophyllae* Schlechtendahl & Chamisso, Arizona, socio *Cronartio conigeno* [illegible] ad cortices *Pini monticolae* socio *Cronartio ribicola*, et *Pini contortae* socio *Cronartio harknessii* et *Cronartio filamentoso*, Oregon.

Obs. Fungus a Fusario trichothecioide recedit macroconidiis crassioribus, interdum numero majori septorum idoneis, colore atro-violaceo stromatis, etc.

Fusarium bactridioides occurs naturally on diseased cone tissues produced by *Cronartium conigenum*. L. N. Goodding, however, has demonstrated its ability to attack other pine rusts by successful inoculations on *Cronartium ribicola*, *C. harknessii* and *C. filamentosum*.

The following note by Mr. Goodding is of interest in connection with the behavior of this Fusarium:

Inoculations with *F. bactridioides* were made on blister rust cankers on western white pine (*Pinus monticola*) in the region of Rhododendron, Clackamas County, Oregon, in July, 1932, and in four localities in Idaho and two in Oregon in July, 1933. Several reports have been received from Crystal Creek, Idaho, of numerous actively sporulating Fusarium infections on blister rust cankers which undoubtedly resulted from the inoculations made there. At Eagle Creek, Oregon, where blister rust attack is very abundant, fully 80 per cent. of the trees sprayed with Fusarium spores in July, 1933, showed all the blister rust cankers parasitized by the Fusarium by late October. In the case of July, 1933, inoculations on trees of *Pinus contorta* infected with *Cronartium harknessii* at Summit Meadows, Clackamas County, and with *C. filamentosum* near Tilly Jane Creek, Hood River County, Oregon, the Fusarium was found actively developing on both rusts by the latter part of October. All blister rust cankers inoculated in 1932 were dead by July, 1933. There is no doubt about the effectiveness of *F. bactridioides* in destroying *Cronartium ribicola* once it attacks the cankers.

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[8] Clark, *Iowa State Jour. Sci.*, 7: 13–16, 1932.

BOOKS RECEIVED

COKER, WILLIAM C. and HENRY R. TOTTEN. *Trees of the Southeastern States.* Pp. 399. Illustrated. University of North Carolina Press. $2.00.

MACBRIDE, THOMAS H. and G. W. MARTIN. *The Myxomycetes.* Pp. 338. 21 plates. Macmillan. $6.00.

NOWLAN, FREDERICK S. *Analytic Geometry.* Second edition. Pp. xii + 352. Illustrated. McGraw-Hill. $2.25.